



Northwest Mountain Region *Guide to Aircraft Alterations*

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PROCEDURES FOR FIELD APPROVALS

1. **PURPOSE**

- a. This Northwest Mountain Region brochure describes acceptable procedures for obtaining a field approval for major changes to type certificated products. To ensure standardization and expediency in the approval process, these procedures are recommended when seeking a field approval.
- b. This brochure provides information on methods of obtaining field approvals of alterations to type certificated products under Part 21, Title 14 of the Code of Federal Regulations (FAR 21), which contains the procedure requirements for certifying aeronautical products and appliances. The brochure includes clarification of major and minor changes to type design, describes the procedures for obtaining a field approval of a major alteration, and includes a glossary of terms defining many of the words and acronyms used in conjunction with aircraft alterations. This brochure does not include procedures for obtaining a Supplemental Type Certificate (STC). The procedures for obtaining an STC are contained in AC 21-40.
- c. A common misconception is that FAA Aviation Safety Inspectors (ASI's) are required or obligated to perform field approvals. That is not the case. It is up to the individual inspector, while following the guidance contained in FAA Orders, Handbooks, etc., to determine if a field approval is appropriate. FAA Order 8300.10, Airworthiness Inspectors Handbook, states that "if the ASI is not thoroughly familiar with all aspects of the alteration or repair, or has any doubt about the expected airworthiness, approval must not be given." In other words, if ASI's have any reservations about field approving an alteration, they will not do so.
- d. In the Northwest Mountain Region, it is our policy to evaluate field approval technical aspects on a group basis, thereby improving the quality of the field approvals we perform.

2. **BACKGROUND**

This brochure addresses the Northwest Mountain Region concerns regarding different policies and procedures used throughout the FAA in granting field approvals. These different policies and procedures may lead to confusion as to which approval procedure is appropriate for a field approval.

3. **RELATED PUBLICATIONS**

This brochure is in addition to, but does not supersede, FAA Order 8300.10, Airworthiness Inspectors Handbook. Specifically, Volume 2, Chapter 1, of Order 8300.10 addresses field approvals. On the internet, FAA Order 8300.10 can be accessed at: <http://www.faa.gov/avr/afs/faq/8300/index.cfm> Many of the technical documents referenced in this publication can be accessed on the internet. There are too many to list, but a good starting point is: <http://www.faa.gov/certification/aircraft/>

4. **REVISIONS**

Requests for revisions to this document should be sent to:

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CHAPTER 1. CERTIFICATION OF AERONAUTICAL PRODUCTS

100. GENERAL

This chapter provides information concerning the regulatory basis for the certification of aeronautical products in the United States. It also lists the regulatory requirements for alteration of those products.

101. AUTHORITY

- a. **General.** The FAA's authority to issue the regulations that govern the design, production, use, alteration, and maintenance of aircraft having a U.S. airworthiness certificate is found in Title 49, United States Code, Subtitle VII, Part A, subpart iii, Chapter 447.
- b. **Federal Aviation Administration (FAA).** Title 49, United States Code, Subtitle VII, Part A, subpart iii, Chapter 447, § 44701 empowered its Administrator to "promote safety of flight of civil aircraft in air commerce by prescribing such minimum standards governing the design, materials, workmanship, construction, and performance of aircraft, aircraft engines, and propellers as may be required in the interest of safety;...[and]...such reasonable rules and regulations, or minimum standards, governing other practices, methods, and procedures, as the Administrator may find necessary to provide adequately for national security and safety in air commerce."
- c. **Federal Aviation Regulations (FAR).** Title 14 of the United States Code of Federal Regulations (CFR), henceforth referred to as FAR's, are the method used by the Administrator to prescribe those standards governing the design, materials, workmanship, construction, and performance of aircraft, aircraft engines, and propellers to meet the requirements set forth in Title 49, United States Code, Subtitle VII, Part A, subpart iii, Chapter 447, § 44701.
- d. **FAA Orders and Advisory Circular's (AC).** FAA Orders and AC's are documents that explain and prescribe the recommended practices and procedures acceptable to the Administrator to meet the requirements of the FAR's. FAA Orders are publications that provide guidance to the Airworthiness Inspector as to conduct of job functions, including instructions and procedures for performing field approvals. Although AC 43.13-1B generally pertains to minor repairs, under certain constraints, it may be used as approved data for major repairs and alterations. Prior to using AC 43.13-1B as approved data, the user must determine that those paragraphs and/or figures used in connection with the major repair/alteration are: appropriate to the product being repaired/alterated; directly applicable to the repair/alteration being made; and not contrary to current manufacturer's data.
- e. **Aircraft Certificates.** Title 49, United States Code, Subtitle VII, Part A, subpart iii, Chapter 447, § 44704 also provides for the FAA Administrator to issue type, production, and airworthiness certificates and to prescribe rules for their issuance and use, including Supplemental Type Certificates (STC's).
- f. **Field Approvals.** Although the word "field approval" is not specifically mentioned in the FAR's, field approvals are an acceptable procedure for obtaining alteration approvals.

102. REGULATIONS

- a. **FAR Part 21** - Certification Procedures for Products and Parts. This FAR Part prescribes the procedural requirements for issuing type certificates and changes to those certificates, production certificates, airworthiness certificates, and other specialized approvals. It also prescribes rules governing the holders of these certificates.

The following are particularly important to understand before requesting a field approval:

- (1). **FAR 21.93(a) classifies minor and major changes to type design.**
 - (2). **FAR 21.113 requires those persons making major changes in type design, to apply to the Administrator for an STC.**
 - (3). **FAR 21.97(a) requires submission of substantiating data and descriptive data for inclusion in the type design, when making major changes.**
- b. **Airworthiness Standards.** The airworthiness standards for aeronautical products were recodified in 1964 from the Civil Air Regulations (CAR) to the Federal Aviation Regulations (FAR). Type certificates issued under the older regulations are still valid. For products having features not sufficiently addressed by the existing regulations or that are intended for special operations and special conditions, Special Federal Aviation Regulations (SFAR) are applied by the administrator. Listed below are the current FAR Parts and in parenthesis, the predecessor CAR parts that prescribe the standards used for the type certification of civil aviation products.
 - (1). Part 21.25 (CAR 8): Aircraft Airworthiness, Restricted Category Aircraft (CAR 8 was available for small restricted category agricultural airplanes only, but is no longer used for new approvals.)
 - (2). Part 23 (CAR 3): Airworthiness Standards, Normal, Utility, Acrobatic, and Commuter Category Airplanes.
 - (3). Part 25 (CAR 4b): (SR422): Airworthiness Standards, Transport Category Airplanes
 - (4). Part 27 (CAR 6): Airworthiness Standards, Normal Category Rotorcraft.
 - (5). Part 29 (CAR 7): Airworthiness Standards, Transport Category Rotorcraft.
 - (6). Part 31: Airworthiness Standards, Manned Free Balloons.
 - (7) Part 33 (CAR 13): Airworthiness Standards, Aircraft Engines.
 - (8). Part 35 (CAR 14): Airworthiness Standards, Propellers.
- c. **Part 36** - Noise Standards: Aircraft Type and Airworthiness Certification. In addition to meeting the certification requirements of Part 21 and the applicable airworthiness standards, applicants for U.S. type and airworthiness certificates must comply with the noise standards of Part 36. This specifies detailed noise limits and measurement methods for all airplanes and helicopters except for those used for agricultural and fire fighting operations. This part, together with Part 91, subpart I (Operating noise Limits), applies noise limits to nearly all civil airplanes and helicopters operated within the United States. Additional field approval constraints are introduced by changes in noise emissions in that:
 - (1). If the modification is determined to be an "acoustical change" (noise level changed by >0.1 db), the modification cannot be field approved.
 - (2) No DER can approve a "no acoustical change" finding, since this is done under 21.93(b).

- (3). Changes that are likely to result in an acoustical change include:
 - (i) any increase in takeoff or landing weight (raises noise levels)
 - (ii) a decrease in takeoff weight (may lower the allowable limit).
 - (iii) any modification that increases aircraft drag and therefore decreases performance.
 - (iv) any power increase.
 - (v) an increase in propeller diameter or RPM
 - (vi) any exhaust system modification.
- d. **SFAR.** Certain Special Federal Aviation Regulations (SFAR) and older Special Regulations (SR) are applicable to aircraft certification. SFAR 23 and 41 impose additional airworthiness standards on certain commuter type aircraft that are still being operated and manufactured. SR 407 specifies additional airworthiness standards that are used for the Douglas DC-3 and Lockheed Model 18 aircraft.
- e. **Parts 43, 45, 65, 91 121, 135, and 145.** Procedures for the maintenance and alteration of aircraft are contained in these regulations.
 - (1). Part 43 (Maintenance Preventive Maintenance, Rebuilding, and Alteration) specifies the performance standards for the maintenance and alteration of aircraft and who may approve an aircraft for return to service after maintenance and alteration.
 - (2). Part 45 (Identification and Registration Marking) specifies methods for identification of aircraft and related products, including data plates, registration numbers, etc.
 - (3). Part 65 (Certification: Airmen, other than Flight Crewmembers) prescribes the eligibility requirements for certification of mechanics and the privileges they may exercise under that certification.
 - (4). Part 91 (General Operating and Flight Rules) specifies that aircraft operated under Part 91 must be maintained in accordance with Part 43.
 - (5) Parts 121 (Air Carrier - Large Aircraft), 125 (Large Aircraft - not common carriage) 135 (Air Taxi), and 145 (Repair Stations) specify responsibilities of these organizations for the performance of maintenance, and describes the conditions under which they may approve an aircraft for return to service after maintenance or alteration.

103. CERTIFICATES

- a. **General.** The FAA issues certificates to persons for products that have met the requirements of the applicable FAR. The certificates most relevant to aircraft alterations are type certificates and airworthiness certificates. In addition, pertinent authorizations that are issued via letters rather than certificates are Technical Standard Order (TSO) authorizations and Parts Manufacturer Approvals (PMA).
- b. **Type Certificate (TC).** Type Certificates are issued for aircraft, aircraft engines, and propellers that meet the requirements of FAR Part 21. This certificate is issued to an applicant who has demonstrated that the type design meets the applicable airworthiness and noise requirements of the FAR, and have no unsafe feature or characteristic.
 - (1). **Certification Basis.** The airworthiness standards (FAR, SFAR, and Special Conditions) with which a product was demonstrated to comply with at the time the type certificate was issued, form the certification basis for that aircraft, aircraft engine, or propeller, and are listed in the Type Certificate Data Sheets (TCDS).
 - (2). **Type Certificate Data Sheets (TCDS).** A TCDS (Aircraft Specification or Aircraft Listing for older aircraft) is created for all approved type designs (aircraft, engines, and propellers). These data sheets are compiled by the FAA and are available to the public on the internet at:
http://www1.airweb.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameSet/.

They contain information and specifications regarding each FAA-approved type design and list the regulations constituting the certification basis for each type design.

(3). **Changes to Type Certificates.** Part 21, Subpart D, prescribes the procedural requirements for the approval of changes to type certificates. Part 21, Subpart E, prescribes procedural requirements for the issuance of a Supplemental Type Certificate (STC), which may be applied for by any person. Subpart E addresses the issuance of STC's; however, field approvals, which are major alteration approvals and constitute a change to type design, are an acceptable method of approval and must meet the same regulatory requirements as STC's.

(i). Any alteration to the type design of an aircraft, aircraft engine, or propeller may be shown to comply with the regulations contained in the original certification basis or with the regulations in effect at the time of application. However, if an applicant chooses to use the later regulations, all other amendments that the Administrator finds are directly related must also be used, not just those that the applicant may find desirable or convenient.

(ii). It is important that, prior to commencing any product alteration, the applicant and FAA establish the method of approval and the certification basis applicable to that approval. The certification basis as established will be used for the evaluation of the alteration whether accomplished by Flight Standards or Aircraft Certification personnel.

- c. **Airworthiness Certificates.** All U.S. civil aircraft operated in the U.S. must have a valid airworthiness certificate. A standard airworthiness certificate is issued when an aircraft is shown to conform to the approved type design, and the aircraft is in a condition for safe operation. For the airworthiness certificate to remain valid, the aircraft must be maintained and/or altered in accordance with parts 21, 43, and 91 of the FAR's, and must be registered in the U.S.

- d. **Technical Standard Orders (TSO).**

(1). A TSO is issued by the Administrator and is a minimum performance standard for specified material, parts, processes, or appliances used on civil aircraft. These standards are developed by the FAA and may reference standards prepared and issued by other organizations, such as the Society of Automotive Engineers.

(2). TSO approval of an item does not approve its installation on an aircraft, but shows only that the minimum performance and quality control standards required by that TSO have been met.

(3). When a TSO'd part is installed on an aircraft, its installation must be approved on that particular aircraft. The approving authority determines that the part can perform its intended function after installation and that its operation does not adversely affect the operation of that aircraft and its installed equipment. This approval can be a part of the type certification of the aircraft, by the STC process, by a field approval, or by a person delegated authority by the FAA to make such approvals.

- e. **Parts Manufacturer Approval (PMA).**

(1). A PMA may be issued for the manufacturer of either a replacement or modified part.

(2). A PMA is issued to an applicant when the Administrator finds that the design of the part meets the applicable airworthiness requirements. The applicant must also have a quality control system to ensure that each completed part conforms to its design data.

(3). The PMA approval of a part includes approval of the item's installation on a specific TC'd product. No further FAA approval should be required. However, it is important to note that a PMA part is approved for installation in the specific product by make, model, and perhaps serial number range. Installation of the PMA part on any other product requires additional approval.

CHAPTER 2. MAJOR AND MINOR ALTERATIONS

200. GENERAL This chapter describes major alterations, minor alterations, and type design changes, and gives examples of each. Type design changes, alterations, and modifications are all terms that describe the same thing; changes to the design of the aircraft, aircraft engine, propeller, or appliance as previously approved by the FAA.

201. MAJOR VS. MINOR ALTERATIONS

- a. The definition of major alteration in FAR 1 is: “Major Alteration” means an alteration not listed in the aircraft, aircraft engine, or propeller specifications-
 - (1). That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
 - (2). That is not done according to accepted practices or cannot be done by elementary operations.
- b. This definition is reasonably clear except the meaning of “appreciably” and the phrase “...or other qualities affecting airworthiness...”. In this regard, major alteration is considered to include any alteration which as a result of malfunction or improper accomplishment could:
 - (1). Preclude continued safe flight and landing in any type operation for which the aircraft is approved; or
 - (2). Adversely affect the safety of crew or passengers.
- c. A minor alteration is defined as any alteration other than major.

202. DISCUSSION

- a. **For practical purposes**, alterations and changes to type design have the same definition. Part 43, appendix A, provides a listing of product alterations classified as major alterations. This list is not and cannot be all-inclusive. Anyone proposing to alter or approve an alteration to a type certificated product must make a judgement whether the alteration is major or minor. The definition in FAR 1 serves as the foundation to make this judgement. As noted in paragraph 201, the difficulty in applying these definitions is determining the meaning of “appreciable” and “other qualities affecting airworthiness”.
- b. **The list provided** in this brochure (Chapter 4) gives examples of typical alterations that normally require Aircraft Certification Office (ACO) evaluation and approval. This list includes alterations which may require an STC for approval. These alterations are considered major alterations.
- c. **“Appreciable effect”** and other “qualities affecting airworthiness” must be considered for the proposed alteration. Webster’s 9th New Collegiate Dictionary definition of appreciable is “capable of being valued or estimated”. Thus any effect that could be valued or estimated would be appreciable. Appreciable is the value of such measurable effect.
- d. **Weight and Balance**, Part 43, Appendix A(a)(xi), is definitive here. If an alteration results in an increase in the maximum certificated weight or center of gravity limits of the aircraft, the effect is appreciable and the alteration is major. If the alteration does not result in the weight or center of gravity limitations being exceeded, or the mass distribution being changed, then it is a minor alteration with regard to weight and balance. Mass distribution changes, such as addition of tip tanks or replacement of an engine with a heavier engine, constitute mass distribution changes requiring engineering evaluation, even if maximum weight limits are not exceeded.

- e. **Structural strength.** Generally, structural strength is determined by engineering analysis or tests. If engineering analysis or tests are required to determine the effect of the alteration, then it is major. However, if the structural alteration involved is performed according to standard practices (using acceptable data that serves as the basis for an approval) and the structural strength of the product has not been lessened or impaired by the alteration, then the alteration is minor with regard to structural strength. Improving structural strength, in some cases, can have a detrimental effect on other structures, and must be considered.
- f. **Performance.** Aircraft performance is determined primarily by the difference in the aircraft's available thrust and the aircraft's aerodynamic drag in a given flight condition. Any alteration to the aircraft, aircraft engine, or propeller that may affect thrust, drag, or other changes that may affect the airflow over the aircraft, is likely to affect performance. If experience or accepted guidelines have demonstrated that the alteration (such as a small antenna installation) does not produce a measurable effect on performance, then the alteration is minor with regard to performance.
- g. **Powerplant operation.** The certification regulations, both for the engine and aircraft, require extensive testing of the powerplant installation to verify its reliable operation within established operation limitations on parameters such as temperature, RPM, pressure, carburetor icing, etc. Any alteration that would require retest or engineering analysis to measure the effect and significance of reliable operation would be a major alteration. This would include any alteration that could change airflow, either around (cooling) or through (power) the engine. Such alterations might be changes to the cowling shape, cooling airflow baffles, and induction and exhaust systems. Similarly, any change to fuel or oil systems that could affect flow, pressure, or temperature (such as filter installations) would be major alterations. Changes to powerplant controls are generally a major alteration because they require test and evaluation to determine (measure) the effect.
- h. **Flight characteristics** are similar to and closely related to aircraft performance. Any measurable change to thrust or drag that affects performance is also likely to affect flight characteristics and requires engineering flight test for evaluation. Thus, any alteration that may produce such an effect, such as a change in the length or width of flight controls or power, is a major alteration.
- i. **Other qualities affecting airworthiness.** This is an area where the examples of paragraph 201(b) could be of particular use. Could the alteration as a result of malfunction or improper accomplishment "preclude continued safe flight or landing" or "adversely affect the safety of crew or passengers?" This could encompass areas such as landing gear, personal accommodations and human factors (pilots view, cockpit arrangement, lighting adequacy, ventilation, emergency egress, shoulder harnesses, etc.), and functioning installed equipment (navigation, communications, flight instruments, etc.).

The net effect to a weight change, for example, is totally dependent upon the location (flight station, water line, etc.) not the actual weight of the article.

Therefore, a five pound weight change at station 186 on a Piper Cherokee 140, for example, may result in a major alteration (or major change) as opposed to a five pound weight change at station 72, which may result in a minor alteration.

- j. **It is important** to understand that installation of a part with no prior approval (replacement part, new piece of equipment, etc.) may constitute a major alteration and would need to be evaluated. This would include installation of a replacement part made, for example, by another manufacturer than the one which made the part on the original type design; or a different configuration of the same part, made by the original manufacturer; or a new piece of equipment; or a part made by the owner/operator for installation on his own aircraft. If the part in question was not manufactured under a PMA, or by the original type certificate holder, it must have some sort of design approval as well as an installation approval.

- k. **Manufacturers approved alterations.** An exception to the previous discussion concerning the determination of major versus minor are those alterations approved during the type certification process and listed on the product specifications or type certificate data sheet. Regardless of the nature of the alteration (e.g. optional engine or propeller), if it is listed on the specifications or type certificate data sheet, installation of the alteration using the aircraft, engine, or propeller manufacturer's instructions is considered a minor alteration.
- l. **Negligible**, which is often referred to with respect to such effects, is defined as "that [which] can be disregarded; inconsiderable; trifling; of little importance or size".

203. APPROVAL OF MAJOR AND MINOR ALTERATIONS

- a. **Major.** Approval of major alterations to any type certificated product (aircraft, aircraft engine, or propeller) is accomplished in three ways.
 - (1). **Type Design Change.** The TC holder may submit a change to the type design for approval by the FAA. If there are significant differences between the original product and the altered one, the type certificate is amended in accordance with FAR 21, Subpart D. If the FAA has granted the TC holder a delegation option authorization (DOA), the TC holder may approve changes to the type design.
 - (2). **Supplemental Type Certificate.** Any person may apply for an STC to make a major alteration to a type certificated product. The STC approval process is normally used for major alterations that require detailed engineering analysis. FAR 21, Subpart E, prescribes the requirements. The specific procedures are available from any Aircraft Certification Office (ACO) in AC 21-40.
 - (3). **Field Approval.** Any person may apply for field approval of a major alteration to a type certificated product. Field approvals are normally used for major alterations that do not require a detailed engineering analysis. A field approval is comparable to an STC.
- b. **Minor.** Minor alterations to a type certificated product are accomplished by any appropriately qualified and certificated person (mechanic, repair station, air carrier) using data acceptable to the Administrator. Approvals for return to service are accomplished using a log book entry in accordance with FAR 43.5.
- c. **Use of Existing STC's.** An applicant may use a previously approved STC on an aircraft in lieu of getting a new STC, provided the aircraft is eligible on the previously approved STC by make, model, and serial number range. The applicant needs to obtain the installation data and kits from the STC holder. No additional FAA approval would be required. This only applies to those STC's approved for duplication by the ACO, not one time only STC's that are designated by make, model, specific serial number, and sometimes "N" number. **BEWARE OF INDIVIDUALS SELLING ONE TIME STC's THAT PROMISE THE FAA WILL APPROVE THEIR INSTALLATION OR STATE THAT NO FURTHER APPROVAL IS NECESSARY.** The FAA publishes a "Supplemental Type Certificates Listing", which lists existing STC's by aircraft make and model. Prior to initiation of any major alteration work, review this publication to determine if an applicable STC exists. A copy of the summary can be reviewed at any ACO. An internet site that contains STC's can be accessed at: <http://av-info.faa.gov/stc/>
- e. **Permission to Use STC Data.** Title 49, United States Code, Subtitle VII, Part A, subpart iii, Chapter 447, § 44704(b)(3), requires the holder of a Supplemental Type Certificate (STC), who agrees to permit another person to use that STC to modify an aircraft, aircraft engine, propeller, or appliance, to provide the other person with written evidence, acceptable to the Administrator, of that agreement. Further, a person making a change to an aircraft, aircraft engine, propeller, or appliance based on an STC, may do so, only if the person requesting the change is the holder of the STC, or has the STC holder's permission.

CHAPTER 3. DATA

300. GENERAL

- a. **Definition.** Data encompasses a wide range of materials, generally written down, or recorded, to document a specific event, design, methodology, test result, or other means of compliance. As used in this brochure, “data” refers to either:
 - (1) the drawings, specifications, reports, and other material that constitute a type design; or
 - (2) the written material that describes those “methods, techniques, and practices acceptable to the Administrator” for use in “performing maintenance, alteration, or preventive maintenance on an aircraft, aircraft engine, propeller, or appliance.”

Part (1) of this definition relates to FAR 21.31 that defines a “type design.” Part (2) of this definition relates to and includes excerpts from FAR 43.13 that specify the performance requirements for maintenance and alterations to certificated aircraft, aircraft engines, propellers, and appliances.
- b. **Applicability.** Any aircraft having a U.S. airworthiness certificate (except experimental) and any foreign registered aircraft operated under the provisions of FAR’s 121, 127, or 135 must be maintained, rebuilt, and altered as specified in FAR 43 and applicable paragraphs of FAR 121, 135, and 145. Also, FAR 43.13 requires that maintenance and alterations be performed using methods, techniques, and practices “acceptable to the Administrator.” These methods, techniques, and practices are described in written or other permanent form. This recorded description thus becomes “data” acceptable to the Administrator. It may be, but is not necessarily, “approved data”.
 - (1) FAR 65 provides that, for anyone to approve an aircraft for return to service after a major alteration, the work must have been done in accordance with technical data approved by the Administrator. As it relates to aircraft alterations, this is the basis for the requirement for “approved data.”
- c. **Types of Data.** There are two basic types of data used in the substantiation of alterations to aircraft, aircraft engines, and propellers. These are “approved data” and “acceptable data.” “Approved” means approved by the Administrator. The Administrator may delegate the authority to approve data to certain FAA employees or to a designated representative. “Acceptable data” means data acceptable to the Administrator which includes the data provided by advisory circulars, manufacturers technical documents, Mil Specs, and data from other similar installations.

301. APPROVED DATA

- a. **Authority.** FAA personnel in the Aircraft Certification Service and the Flight Standards Service are delegated the authority to approve descriptive and substantiating data associated with product alterations. These individuals include authorized ASI’s, aerospace engineers, and flight test pilots. Additionally, under the delegation authority of FAR 183, private individuals that are not FAA employees are authorized to approve data. These include Designated Engineering Representatives (DER), certain aircraft manufacturers with Delegation Option Authority (DOA), and Designated Alteration Stations (DAS). **However, data approval by a DER, in itself, does not constitute approval of the complete installation of the design change. Many times a DER structural analysis becomes the basis for FAA approval of the complete installation.**
- b. **Type Design Data.** Type design data consists of the drawings, specifications, drawing lists, and other information on dimensions, materials, and processes necessary to define the configuration and design features of the product. Other information contained in the type design data includes the Airworthiness Limitations section of the Instructions for Continued Airworthiness. Similarly, a FAA approved Airplane or Rotorcraft Flight Manual is part of the type design data. The FAA must have possession of or access to all the type design data.

- c. **Supplemental Type Certificate Data.** STC data is approved by authorized FAA personnel, DER's, or a DAS. Supplemental type design data is similar to type design data except that:
 - (1). STC data must contain sufficiently detailed installation instructions if the STC and/or a parts kit is sold to an installer other than the STC holder (multiple STC).
 - (2). If the descriptive data (i.e. drawings, photos) are not sufficient to reproduce the alteration, the STC is limited to one serial numbered product (one-time STC).
 - (3). When an alteration has been performed in accordance with an STC, the type design for that product is now defined by both the TC and STC data for that product.
- d. **FAA Form 337, Major Repair and Alteration.** The FAA Form 337, (block 3), may also be used for data approval by authorized ASI's. Authorized FAA employees may approve data via the appropriate statement and their signature on Block 3 of FAA Form 337.
- e. **FAA Form 8110.3, Statement of Compliance.** Designated Engineering Representatives (DER's) are granted limited authority under the FAR's to approve data and if authorized, to witness and approve test results. DER's are appointed in particular engineering specialties and authorized to approve data only in specific areas for which they have demonstrated expertise. Applicant should be aware of a DER's limitations and can verify these limitations by contacting the ACO that issued the DER certificate. The only means a DER has to approve data is on Form 8110.3, Statement of Compliance with the Federal Aviation Regulations. This form must show the extent of the approval intended by the DER. A DER, using FAA Form 8110.3, may approve technical data to show compliance with the regulations for a TC, STC, or Field Approval, **however, data approval by a DER, in itself, does not constitute approval of the complete installation of the design change.** All data approved on FAA Form 8110.3 is "data approved by the Administrator" and has the same validity as data approved by FAA personnel.
- f. **Airworthiness Directive (AD).** The FAA issues airworthiness directives under FAR 39 to correct unsafe conditions in existing type certificated products. FAR 21.99 requires the holder of a type certificate to provide data describing the changes required to correct the unsafe condition. This data may be in the form of an approved manufacturer's service bulletin or instruction or any other form referenced in the AD, including the text of the AD itself. Since the FAA approves the necessary safety related changes to the type design during the AD process, all such data is approved.
- g. **Manufacturer's Service Documents (if FAA Approved).** Product manufacturers frequently publish and distribute service documents (bulletins, instructions, letters, etc.) to inform the user of product improvements or other service information. If these documents result in a change to the type design, they must be FAA Approved, and will so state on the document. The resulting data describing the type design change is thus "data approved by the Administrator" just like other TC, STC, and/or field approved data.

302. DATA ACCEPTABLE TO THE ADMINISTRATOR

- a. **General.** All work on an aircraft having a U.S. airworthiness certificate including those used in U.S. air carrier or air taxi service must use methods, techniques, and practices acceptable to the Administrator. The recorded description of these methods, techniques, and practices is known as data acceptable to the Administrator. This acceptable data can become approved when made a part of an installation and specifically approved. Data may come from many sources and may take a number of different forms. The most common forms are described in the following paragraphs.
- b. **Acceptable versus Approved Data.** If the data is approved by the Administrator, it is also data acceptable to the Administrator. However, acceptable data is not necessarily approved data. Under FAR 21.97, all major alterations must be accomplished using data approved by the Administrator. Under FAR 21.95, minor alterations may be accomplished with data acceptable to the Administrator.

- c. **Advisory Circular.** The FAA publishes and distributes AC's to the aviation public as a means of communicating necessary and helpful information regarding safety and compliance with the regulations. AC's dealing with regulatory compliance usually present an acceptable means of compliance although it may not be the only means. All data presented in AC's (except under the restrictions listed in paragraph 101(d) of this brochure) is data acceptable to the Administrator.
- d. **Manufacturer's Information.** Manufacturer's maintenance and overhaul manuals and non-FAA approved service documents generally provide methods, techniques, and practices that are acceptable to the Administrator. This information is primarily of a service and maintenance/overhaul nature and if followed does not result in a change to the type design of the product. Some maintenance manuals include airworthiness limitations sections which are approved data.
- e. **Other.** Other methods, techniques, and practices that are accepted as aviation industry practice may be acceptable to the Administrator even though not specified in a given document. If any person desires to use these practices and is not sure if they are acceptable to the Administrator, contact the nearest Flight Standards District Office or Aircraft Certification Office for help.

303. DATA NOT APPROVED OR ACCEPTABLE TO THE ADMINISTRATOR

- a. **General.** There is much information available to the aviation public that has had no evaluation of acceptability or approval. This information is not FAA approved, and it usually has not been put to the test of practical experience. Some alterations that have been installed may appear to have undergone practical experience. But in reality, the aircraft involved have never approached the edge of the aircraft safe operating envelope, and the effects of the alteration evaluated. Information of this nature is found in sales catalogs or brochures, newsletters, magazines, etc. Additionally, manufacturer's parts lists, illustrated parts catalogs, and similar documents, while useful, are not approved and do not provide data acceptable to the Administrator unless they are an integral part of a maintenance manual and are not just listed as a reference.
- b. **Communications.** When in doubt about the status of data or a prospective methodology, contact the nearest Flight Standards District Office or Aircraft Certification Office. An Airworthiness Inspector, Aerospace Engineer, or Flight Test Pilot, or Manufacturing Inspector will be available to provide guidance in their appropriate discipline, or make certain that the answer is forthcoming. However, these FAA personnel cannot approve or otherwise change the status of data over the telephone. Data can only be approved through the process described in this brochure.

CHAPTER 4. APPLICATION PROCEDURES

400. GENERAL This chapter provides a procedure that should be followed when applying for approval of a major alteration to a type certificated product.

401. APPROVAL METHODS There are two methods of FAA approval of major alterations that are of concern in this brochure. They are field approvals and supplemental type certificates.

- a. **Supplemental Type Certificate.** Any person may apply for an STC for a major alteration to a type certificated product. The STC approval procedure is normally used for major alterations that require detailed engineering analysis.
NOTE: It is the installers responsibility to determine that the STC is compatible for installation on a particular aircraft that has been previously altered.
- b. **Field Approval.** Any person may apply for a field approval for a major alteration to a type certificated product. Field approvals are normally used for major alterations that do not require a detailed engineering analysis. They are normally used for alterations that are made to only one product by serial number.

402. MAJOR ALTERATIONS USING PREVIOUSLY APPROVED DATA

A major alteration that has already been approved by the FAA, through STC, for that particular application, does not require additional FAA approval. A FAA Form 337 will be used to record the work, without block 3 being signed.

- a. **Aircraft undergoing major alterations** using previously approved data are approved for return to service by the appropriate persons authorized by FAR 43.7, 65, 121, 135, or 145. The authorized person signing block 7 of FAA Form 337 is responsible for ensuring that the data addresses all aspects of the alteration and that compliance has been shown for all aspects of the alteration.
- b. **Approved data is discussed** in Chapter 3. When using approved data developed by a DER, applicants must be aware of the DER's limitations and that all aspects of the alteration may not be approved. DER limitations may be verified by contacting an ACO.

403. ALTERATION OF OLDER AIRCRAFT

- a. **Many older aircraft** were certificated to standards that were written before the advent of modern equipment and technology. Examples of these standards are Aeronautics Bulletin No. 7, Civil Aeronautics Manual (CAM) 04, and all of the subsequent Civil Aeronautics Regulation (CAR) parts and their accompanying CAM policy material. Most of these references are available at the internet site http://av-info.faa.gov/dst/predecessor_regulations.htm. These older standards may be inadequate to maintain the appropriate level of safety when alterations involving new technology and/or equipment are made on these older aircraft. In this case, compliance with appropriate later regulations and/or special conditions may be required under the provisions of FAR 21.101(b). An alteration of this nature will require an STC.
- b. **The policy information** contained in CAM's 1, 3, 4a, 4b, 5, 6, 7, 9, 13, and 14 applies to the corresponding CAR parts. However, this policy information may be used in conjunction with specific FAR sections which essentially contain the same regulations as the corresponding CAR sections unless there is a more current policy for those sections. This policy information sets forth acceptable procedures and practices for the guidance of the public in complying with the regulations.

404. ALTERATIONS REQUIRING ACO ENGINEERING APPROVAL

Items (a) through (o) in the following list of typical alterations will most likely require engineering approval, and often require an STC. Items in (p) do not normally require an STC but will usually require ACO engineering assistance.

- a. **Increase in gross weight** and/or changes in c.g. range.

- b. **Installation or relocation of equipment and systems** or changes which may adversely affect structural integrity, flight or ground handling characteristics of aircraft. For example, engines and/or propellers of a different make or model not listed in the type certificate data sheet, or the relocation or change of throttle levers, flap controls, and similar, alterations.
- c. **Any change (alteration) of movable control surfaces** which may adversely disturb the dynamic or static balance, alter the contour, length, or width, and/or make any difference (plus or minus) in the weight distribution, and any addition of control surfaces not contained in the original type design.
- d. **Change in control surface travels** (reduced travels or travels outside approved limits), control system mechanical advantage, location of control system component parts, or direction of motion of controls.
- e. **Changes in basic dimensions** or external configuration of the aircraft, such as wing and tail plan-form or incidence angles, canopy, cowlings, contour or radii, or location of wing and tail fairings.
- f. **Changes to landing gear**, such as internal parts of shock struts, length, geometry, or brakes and brake systems.
- g. **Any change to engine cowling and/or baffling** which may adversely affect the flow of cooling air and/or manifold.
- h. **Changes to primary structure** which may adversely affect strength, flutter, or vibration characteristics.
- i. **Changes to systems** which may adversely affect aircraft airworthiness such as the relocation of exterior fuel vents, use of hydraulic components, tube material and fittings not previously approved or use of new fusible hydraulic plugs.
- j. **Changes to oil and fuel lines or systems** which may adversely affect their operation, such as a new type of hose or hose fittings, changes in fuel dump valves, new fuel cell sealants, new fuel or oil line materials, and new fuel or oil tanks and system components.
- k. **Any change to the basic** aircraft engine propeller controls or operating limitations, and changes to engine adjustments and settings having an effect on power output.
- l. **Changes in a fixed fire extinguisher** or detector system which may adversely affect the system effectiveness or reliability, such as relocation of discharge nozzle or detector units; use of new or different detector components in new circuit arrangements; deletion of detector units or discharge nozzles; change in extinguishing agent or decrease in amount of extinguishing agent.
- m. **Changes which do not conform** to the minimum standards established in a Technical Standard Order under which a particular aircraft component or appliance is manufactured.
- n. **Alterations to TSO'd equipment;** (e.g., communication and navigation, avionics, seats, wheels, tires, etc.). Any change to a TSO's item invalidates the TSO approval.
- o. **Changes to aircraft structure or cabin interior** of aircraft that may adversely affect evacuation of occupants in any manner or change the type certificated seating configuration, i.e. including seat pitch or passenger service unit location.

- p. Alterations using but not limited to the following processes and/or materials require engineering assistance:
- (1). Use of new synthetic covering materials.
 - (2). Substitution of materials, parts, or processes on which insufficient information is available to determine equivalency with the original.
 - (3). New chrome applications.
 - (4). New titanium applications.
 - (5). Ceramic coatings.
 - (6). Use of synthetic resin glues.
 - (7). New stripping materials or processes.
 - (8). New plating coatings.
 - (9). New welding or brazing techniques.
 - (10). Installation of parts or equipment not produced under a PMA, TSO, or by the original TC holder, which are required by the operating rules that the aircraft will be operated under.
 - (11). Welding of certain types of propeller or engine parts.
 - (12). New magnesium applications.

405. APPLICATION PROCEDURE The applicant for a major alteration should determine which approval method is appropriate before proceeding with the alteration. However, the final decision as to whether a field approval or engineering approval is appropriate lies with the FAA. The following procedure should be followed when applying for approval of a major alteration, where no previously approved data is available.

- a. **Engineering approval** (STC's Amended TC's, etc.). If the applicant determines that applying for an engineering approval is appropriate, the application (FAA Form 8110-12) should be completed and submitted to the local ACO in accordance with the STC process in AC 21-40.
- b. **Field approval**
 - (1). If the applicant determines that applying for a field approval is appropriate, all proposed alteration data that will be used as the basis for the alteration, should be submitted on a **FAA Form 337***, to the local FSDO for review. In addition to the standard 337 data, the assigned airworthiness inspector will need to know certain other information. **Figure 4-1** is a form that may be used for your convenience in supplying that information. This form is not required, however, the information is.
 - (2). The application will be reviewed to determine if the requested alteration is appropriate for a field approval, or if an STC is required. The FSDO will acknowledge the application in writing, informing the applicant whether or not the local FSDO will be able to proceed with the project. The assigned inspector may contact the regional ACO to determine the appropriateness of the field approval. Additionally, if a flight manual supplement is required, the inspector will coordinate approval with the ACO for that geographic region.
 - (3). If the inspector determines that the proposed alteration can be field approved but does not have the necessary knowledge or expertise for all aspects of the alteration, the inspector will seek assistance from other inspectors or engineering. Approval or denial will not be given until the necessary assistance has been acquired.
 - (4). If the alteration requires an STC, the application will be returned, and the applicant will be advised to apply for an STC.

(5). **NEVER perform** any alteration on any aircraft prior to gaining FAA approval on the data you intend to use. To do otherwise could render the aircraft unairworthy and can be costly and frustrating to the aircraft owner, mechanic and FAA Inspectors. Possible problems that might occur can be missing data, aircraft parts not compatible, aircraft not compatible and previous alterations making the proposed alteration ineligible, or impractical.

***Note:** The proposed field approval can be submitted for FAA evaluation on an unsigned Form 337, however, all substantiating information/data must be included. It may be easier to submit supporting documentation for the proposal, using the form as outlined in Figure 4-1. A blank “Field Approval Application”, which can be copied for your use, follows Figure 4-1. This form may be used in lieu of the Form 337 until final recordation of approval.



U.S. Department
of Transportation

**Federal Aviation
Administration**

RECOMMENDED FIELD APPROVAL APPLICATION

Portland Flight Standards District Office

Instructions: Print or type all entries. This information should be as complete as possible prior to your initial submission to the FAA.

I. Aircraft	Make	Model
	Serial No.	Registration Number N
II. Owner	Name	Address

III. TYPE OF PRODUCT & CERTIFICATION BASIS

☐ AIRFRAME ☐ ENGINE ☐ APPLIANCE ☐ PROPELLER

☐ OTHER: _____

TCDS Number: _____

☐ CAR 3 ☐ CAR 4(b) ☐ CAR 6 ☐ CAR 7 ☐ CAR 8 ☐ CAR 13
☐ FAR 23 ☐ FAR 25 ☐ FAR 27 ☐ FAR 29 ☐ FAR 33

IV. BRIEF DESCRIPTION OF PROJECT:

V. PROPOSED SCHEDULE FOR COMPLETION OF PROJECT

Projected Start Date: _____

Projected completion date for alteration: _____

VI WHO WILL PERFORM THE ALTERATION?

Mechanic's Name _____ or Repair Station: _____

Certificate No: _____ Contact Person at the facility: _____

Telephone Number: _____

Location where alteration/repair will be accomplished: _____

VII. DESIGNEES (DARs & DERs) ☐ None

Names and telephone numbers of the Designated Engineering Representatives, (DER) or Designated Airworthiness Representatives who are helping you with the project.

Name: _____ Telephone No: _____

Name: _____ Telephone No: _____

VIII. PREVIOUS ALTERATIONS

Provide a list of all alterations that have been accomplished on this aircraft. Are any of the listed alterations adversely affected by your new alteration? If so, attach copies of the data used to make the previous alterations. (Such as FAA Form 337s, Airworthiness Directives, STCs, Service Letters/Bulletins, etc.) Assess this alteration in light of all other alterations especially as it relates to structural integrity, performance, and flight characteristics. This also includes flight manual supplements and Instructions for Continued Airworthiness.

IX. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA)

How will the affected part of the aircraft be inspected and maintained? (**Attach a copy of what you will include on the FAA Form 337**) Refer to ICA Checklist on page 4. For more information on ICA refer to the guidance on pages 5 through 7.

X. FLIGHT MANUAL SUPPLEMENT

Are there changes in the aircraft operating limitations or flight data contained in the approved flight manual? If so, please attach the proposed flight manual supplement.

XI. FLIGHT TEST & FLIGHT CHARACTERISTICS EVALUATION

Is any portion of the alteration going to affect the normal flow of air across the lifting or controlling surfaces? ☐ Yes ☐ No
Will any portion of the alteration affect the flight characteristics in any other way? ☐ Yes ☐ No

XII. DATA ATTACHED:

1. ☐ Proposed FAA Form 337
2. ☐ Description of alteration including Instructions for Continued Airworthiness
3. ☐ Drawings, Schematics & Diagrams
4. ☐ Material List
5. ☐ Processes
6. ☐ Specifications
7. ☐ Previous Field Approvals (**NOTE: Previously approved 337's may be acceptable data, but do not guarantee approval or acceptance of the current project.**)
8. ☐ FAA FORM(S) 8110.3 - How many? _____
9. ☐ Placards
10. ☐ Test Data and/or Flight Test Data
11. ☐ Load Analysis (electrical and/or structural)
12. ☐ Other approved or acceptable data. Explain: _____
13. ☐ Other: _____

XIII. COORDINATED FIELD APPROVAL ISSUE(S): (Note: this block is for FAA Use Only)

The following Regulations require review for compliance by the Aircraft Certification Office:

Flight Manual Supplement approval required. ☐ Yes ☐ No
Flight Test required for this alteration. ☐ Yes ☐ No

DATE: _____
ASSIGNED INSPECTOR: _____
FSDO _____
ADDITIONAL INFORMATION REQUIRED:

☐ - This alteration exceeds the scope of a Field Approval. It must be forwarded to the ACO for disposition.

ASI NAME: _____

DATE: _____

CHAPTER 5. FIELD APPROVAL PROCESS

500. SCOPE AND CONTENTS This chapter provides instructions and guidance for the approval of major alterations via the field approval process.

501. BASES OF FIELD APPROVAL

- a. A field approval is granted by applying the same airworthiness standards as applied to an STC, and any necessary data that must be developed as a part of the process. A field approval is used for alterations that are not considered a major change to type design. A field approval will be processed and approved by an airworthiness inspector.
- b. Only FAA personnel authorized by the controlling FAA Region, with proper training, expertise, and approval, can process and issue field approvals.
- c. The inspector will evaluate the airworthiness of an alteration and can grant a field approval provided that it is determined, through the inspector's personal experience and training, and that he/she is familiar and knowledgeable of the methods, techniques, and materials of the proposed alteration. The inspector must be able to determine if, by granting a field approval, the affected product can be expected to result in safe operation and conforms to regulatory requirements.
- d. Approval will be indicated in block 3, FAA Form 337, when the inspector determines that the data to be used in performing the major alteration complies with accepted industry practices, all applicable, regulatory requirements and is expected to result in safe operation of the aircraft. The inspector will sign and date block 3 of the 337 using the verbiage contained in one of the following methods:
 - (1). Approval by Examination of Data Only - One Aircraft. The data identified herein complies with applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized under FAR 43.7.
 - (2). Approval by Examination of Data Only - Duplication of Identical Aircraft. The alteration identified herein complies with the applicable airworthiness requirements and is approved for duplication on identical aircraft make, model, and altered configuration when accomplished by the original modifier.
 - (3). Approval by Physical Inspection Demonstration. Testing etc. One Aircraft. The alteration identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized under FAR 43.7.

Note: Block 3 may sometimes include coordination with the ACO or multiple approval authorization.

- e. After FAA data/alteration approval, alteration is completed when the appropriate inspections and tests are conducted as specified, and a conformity inspection is completed by an appropriately rated person. When the mechanic signs the conformity statement on the FAA Form 337, he/she is stating that the alteration was done in accordance with that approved data. The approval for return to service is performed by a person authorized by FAR 43.7. When the appropriate person signs on the bottom of the form, he/she is stating that the work was done in accordance with the approved data and that the aircraft is approved for return to service. **The person signing the approval for return to service has the final responsibility to assure that the alteration was done in accordance with approved data and that the aircraft is airworthy.**

502. USE OF DER'S IN FIELD APPROVALS As previously described in paragraph 301, **DER's are authorized to approve data.** If DER approval does not cover all aspects of the alteration, the approving official signing block 3 of the FAA Form 337 approves the rest of the data. When a DER approves data in support of a major alteration or field approval, the DER should ensure that the following has been accomplished.

- a. **The DER must obtain specific approval** from the nearest ACO before assisting with and developing approved data for a specific alteration.

- b. **The DER will submit the original** FAA Form 8110-3 to the appointing ACO, with a copy of the approved data to the approving official. The DER should note on the FAA Form 8110-3 that the purpose is in support of a major alteration and that the approval is design data approval only and not installation approval.
- c. **DER's do not have authority by virtue** of their delegation to grant field approvals for return to service; to sign off a FAA Form 337; to grant data approval by signing log books, flight manuals, or other like documents; or to issue STC's.
- d. **DERs are not authorized to make** "No acoustical change" findings; this requirement is in § 21.93(b), and DERs are not authorized to make findings to FAR 21.

503. TESTS AND INSPECTIONS

- a. **The extent of the tests** and inspections will vary from one field approval project to the next. The FAA inspector must determine:
 - (1). That compliance with the FAR can be determined by the description and physical inspection of the alteration
 - (2). That all necessary tests and inspections are specified including acceptable results for satisfactory completion.
 - (3) Which tests and inspections must be FAA witnessed, and when appropriate, performs compliance and conformity inspections.
- b. **For modifiers** who wish to perform the same alteration on more than one aircraft, the FAA inspector may issue a multiple field approval to the original modifier only. The alteration may only be accomplished on other aircraft of the same make and model. Before issuing a multiple approval, the FAA Inspector will determine:
 - (1). That the data package describes the alteration in sufficient detail to show compliance with the FAR and to allow the original modifier to duplicate the alteration on other aircraft of the same make and model.
 - (2). Which tests and inspections must be FAA witnessed on the first aircraft and also on subsequent aircraft.
- c. **Alterations requiring ACO flight test assistance**
 - (1). Some alterations may require a flight test to show compliance with the regulations; e.g., the alteration which results in an external protuberance or other change in the basic aerodynamic contour of the aircraft. After determining that the alteration is still appropriate for field approval, the inspector will contact the ACO flight test engineer for assistance. The appropriate flight test pilot will work with the inspector to determine what flight-tests are required, who may conduct them, and when to schedule the tests. A DER test pilot may be authorized to conduct the flight tests.
 - (2). Prior to the flight tests, a flight test plan, or type inspection authorization (TIA) form, should be drafted and approved by the authorizing flight test pilot and the field approval inspector. The flight test plan will list the inspections, ground tests, and flight test required by the FAA. In addition, an experimental airworthiness certificate for showing compliance with the CAR/FAR may need to be issued for the test aircraft. Subsequent to the flight test, the resulting data must be analyzed and approved before the flight manual supplement is signed and the field approval process is completed. A test report with the results of the flight tests conducted should be listed in Block 8 of the FAA Form 337 and filed with the substantiating data for the field approval. If a DER pilot is used, the DER pilot should approve the data on a Form 8110-3 and submit a copy to the approving inspector, along with a copy of the test report.

- d. **Flight Test Required** by FAR 91.407. Section 91.407 requires an operational flight test following any maintenance or alteration that may have appreciably changed an aircraft's flight characteristics or substantially affected its operation in flight, unless ground tests or inspections show that these characteristics have not been affected. Most major alterations that are field approved will require this flight test. This test should be utilized to verify proper functioning of all equipment installed by the alteration and will need to be recorded. It should not be used to make certification regulation compliance findings. Paragraph 503(c) of this brochure, outlines the procedures to be followed for certification flight tests. Operational check flights conducted using FAR 91.407 to validate accuracy of GPS or other navigational equipment must follow the following procedure:
1. An entry in block 8 of the 337 will contain an entry stating "The installed [name of system] must undergo an operational check in accordance with FAR 91.407(d) by at least a private pilot and results entered into the aircraft records"
 2. The aircraft must be approved for return to service by a signature in block 7 of the 337.
 3. FAR 1 defines "crewmember" as any person who performs duties in an aircraft in flight, so a person assigned to take data readings is considered a crewmember. The results of the operational check must be entered into the aircraft records. A checklist sheet may be used as an aircraft record if it contains the items listed in FAR 43.9.
 4. Discrepancies must be recorded and corrected as any other maintenance item would be.

504. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Required! Refer to Appendix 4

All aircraft require information for maintaining the aircraft in an airworthy condition. Most aircraft have maintenance manuals for this purpose. Aircraft with a certification basis after January 28, 1981, are required to have a set of instructions for Continued Airworthiness (ref. FAR 21.50) which contain a maintenance manual and other information including an Airworthiness Limitations Section. Any alteration that affects the information contained in a maintenance manual or Instructions for Continued Airworthiness should include a supplement to these manuals which provides the aircraft operator with appropriately revised information. If the FAA approved Airworthiness Limitations Section is affected, the supplementary information must also be approved.

505. FIELD APPROVALS REQUIRING AN AIRCRAFT FLIGHT MANUAL SUPPLEMENT

Often Required! Refer to Appendix 5

Approvals for modifications to all aircraft require a FAA Approved AFM Supplement or FAA Approved Supplemental AFM for modifications that change or add new aircraft limitations, procedures, or performance, regardless of whether they were originally Type Certificated with a FAA approved AFM.

APPENDIX 1

GLOSSARY

AC	Advisory Circular. The agencies primary means of issuing to the public all non-regulatory material of a policy, guidance, and informational nature.
ACO	Aircraft Certification Office. FAA office with the responsibility of certifying aircraft, aircraft engines, and propellers.
AD	Airworthiness Directive.
Administrator	FAA Administrator or any person to whom he or she delegates authority.
Aeronautical Product AFM/AFMS	See product. Airplane Flight Manual / Airplane Flight Manual Supplement.
Aircraft Certification	Department of the FAA that has Service responsibility for aircraft certification (includes the four Directorates and Washington Headquarters Offices).
Airworthy	An aircraft is considered to be airworthy when it is in conformity with its type design and is in a condition for safe operation.
Alteration	Any modification, or change to an aircraft, aircraft engine, or propeller which makes it different than the originally type certificated product.
CAM	Civil Aeronautics Manual. Restatement of CAR with interpretive/policy material included.
CAR	Civil Air Regulation. Superseded by FAR in 1965.
CFR	Code of Federal Regulations. A codified reprint of Federal Regulations. The FAR's are contained in CFR 14.
Certification Basis	Airworthiness requirements with which compliance must be demonstrated before a type certificate, supplemental type certificate or field approval is issued.
Compliance Inspection	Physical inspection of the prototype to determine compliance with FAR/CAR requirements which cannot be determined adequately from an evaluation of the technical data.
DAR	Designated Airworthiness Representative.
DAS	Designated Alteration Station.
DER	Designated Engineering Representative.
DMIR	Designated Manufacturing Inspection Representative.
DOA	Designated Option Authorization.

Directorate	Any of four FAA Aircraft Certification Service organizations which have final authority, accountability, and responsibility for administration of the airworthiness standards for aircraft engines and propellers, small airplanes, transport airplanes, and rotorcraft.
Equivalent Safety Finding	A finding that a method of showing compliance with a rule, although not strictly in accordance with the provisions of the rule, provides a level of safety equivalent to the intent of the rule.
Exemption	An alternate method of complying with a regulatory requirement. An exemption, if granted, may either allow a noncompliance or stipulate additional requirements. Like an equivalent safety finding, it establishes the way in which a literal noncompliance can be dealt with. Exemptions inevitably are valid only for a specific time.
FAA Act	Federal Aviation Act of 1958.
FAR	Federal Aviation Regulations. Used interchangeably with Part.
FR	Federal Register.
FSDO	Flight Standards District Office.
Field Approval	A procedure that an authorized FAA employee may use to evaluate and approve alterations and supporting data, when the alteration is not complex enough to require a supplemental type certificate.
FAA Form 337	The form used to record a major repair or alteration. It is also used to approve aircraft for return to service.
Maintenance	Inspection, overhaul, repair, preservation, and replacement of parts, but excludes preventative maintenance.
Part	Covers a specific regulatory area, e.g., FAR Part 21.
PMA	Parts Manufacturing Approval.
Person	An individual, firm, partnership, corporation, company association, joint- stock association, or government entity. It includes a trustee, receiver, assignee, or similar representative of any of them.
Product	Aircraft, aircraft engine, propeller, or components and parts thereof.
RFM/RFMS	Rotorcraft Flight Manual/Rotorcraft Flight Manual Supplement.
SFAR	Special Federal Aviation Regulation.
STC	Supplemental Type Certificate.
Special Condition	Special airworthiness requirements established where the appropriate airworthiness standards, because of novel or unusual design features, do not contain adequate or appropriate safety standards.
TC	Type Certificate
TCDS	Type Certificate Data Sheet.
TIA	Type Inspection Authorization.
TSO	Technical Standard Order.
Type Design	Drawings and specifications necessary to define the configuration and design features of the product shown to comply with the certification requirements, and airworthiness limitations for continued airworthiness.

APPENDIX 2

AVIONICS MAJOR ALTERATION PROCEDURES

Contact the Northwest Mountain Region avionics inspectors prior to starting your project to discuss whether the project is field approvable. FAA Orders limit our field approval authorization on certain product installations. Items we are not to field approve include TCAS, GPWS, Flight Data Recorder and most EFIS installations.

Approved data from a Designated Engineering Representative (DER) may be necessary in obtaining a field approval for a given installation.

We are asking that the following items be included when completing FAA form 337 major repair/alteration block 8 (description of work accomplished).

Be definitive in your description. Make clear, concise, and legible statements. Begin at the top of the block and end with --END---

1. List: make and model or part # of each piece of equipment being installed or removed, i.e. GPS, relays, wiring.
2. If equipment meets a TSO, is made under PMA, is TC'd, STC'd or conforms to the requirements of an AD, so state.
3. State location of each piece of installed equipment relative to datum or by fuselage station (FS), i.e.; FS 115.0 top, 5 1/2" left of centerline.
4. Explain Procedures for antenna installations.
5. State if the system is a stand-alone system.
6. State if interfacing is accomplished and describe the switching and what occurs in each switch position.
7. If ground and/or functional flight evaluations were accomplished state outcome and to what standard it was conformed. A statement to the effect: Ground and functional flight evaluations were performed IAW, and the system operated per manufacturers operating limitations with no adverse effect on the aircraft its systems, or other installed systems, should be made.
8. State what documents were amended or updated, i.e. log books, equipment list, wt. and balance.
9. State the source from which power is derived.
10. Describe the wiring, i.e., and specifications for wiring and coax.
11. Describe circuit protection, including amperage rating, location, and how it is identified.
12. Describe and identify any components used in the installation, and where they are located. Switches, relays and diodes are examples of the type of components that should be included in the description of work performed.
13. If the alteration is accomplished IAW mfg.'s installation instructions, so state, (see AC 43.13-2A chap 2, para. 22).

14. List any placarding installed.

15. State applicable AC's, and sections of those AC's, FAA memoranda or Orders used as a basis for approval, i.e.,

AC 43.13-1B for structural modifications, hardware and materials selection, wiring- selection and routing, circuit protection selection, Pitot/ Static system modifications, and compass system inspection and calibration.

AC 43.13-2A for structural loading, equipment and antenna installation, and penetration of pressurized structure.

AC 20-12 1 A for LORAN C installations.

AC 20-130A for multi-sensor Nav systems, i.e., FMS' including those incorporating a GPS sensor.

AC 20-138 for both VFR & IFR stand-alone GPS systems.

AC 25-10, Guidance for installation of miscellaneous, non-required electrical equipment.

16. The alteration must conform to the basis under which the aircraft was certified, i.e., FAR 23, and a statement of conformity to applicable sections made, i.e., 23 subpart F.

17. Include Instructions for Continued Airworthiness.

REMEMBER! FAR 65.95 states in part: The holder of an inspection authorization may inspect and return to service an aircraft following major alteration if the work was done IAW technical data approved by the administrator.

Since a large percentage of avionics alterations are for GPS systems, a separate handout is available strictly for GPS installations. The handout includes all forms, checklists and procedures for either VFR or IFR GPS approvals.

APPENDIX 3

Use Of Portable Equipment Aboard Aircraft

To assist in determining when and/or how portable equipment is to be approved the following information is provided.

1. Any use of portable equipment must be consistent with FAR 91.21,
2. Any accommodations for such portable equipment involving rivets, bolts, cut metal, etc., on the airframe must have some kind of data and a notation in the aircraft records. This may involve:
 - a. A logbook entry documenting a minor alteration such as for an antenna installation,
 - b. A Form 337 for a major alteration referring to previously approved data, or
 - c. A Form 337 with a field approval for a major alteration wherein acceptable data does not already exist such as fabricating a radio rack not per AC 43.13.
3. Use of portable equipment that a pilot carries aboard and plugs into a headphone jack, cigar lighter, external antenna, or other previously documented accommodation requires no record of installation, use or removal.

APPENDIX 4

Instructions for Continued Airworthiness

ORDER: 8300.10

APPENDIX: 4

BULLETIN TYPE: Flight Standards Handbook Bulletin
for Airworthiness (HBAW)

BULLETIN NUMBER: HBAW 98-18

BULLETIN TITLE: Checklist for Instructions for Continued
Airworthiness for Major Alterations
Approved Under the Field Approval Process

EFFECTIVE DATE: 10-07-98

TRACKING NUMBER: N/A

1. **Purpose.** This bulletin is in response to Federal Aviation Administration (FAA) field requests for guidance on what constitutes acceptable Instructions for Continued Airworthiness (ICA) for major alterations accomplished under a Field Approval, as addressed by Flight Standards Information Bulletin for Airworthiness FSAW 98-03. This bulletin includes an ICA checklist which was developed using extensive regional office and field inspector input.

A. The purpose of the ICA is to provide instructions on how to maintain aircraft which are altered and appliances which are installed in accordance with a field approved major alteration. The ICA checklist is a guide for both the applicant who creates the ICA and the FAA Flight Standards inspector who accepts the ICA. The ICA developed in accordance with this guidance constitutes methods, techniques and practices “acceptable” to the Administrator. If the ICA for the submitted field approval major alteration is not acceptable to the FAA inspector, that inspector should not sign Block 3 of the applicant’s FAA Form 337, Major Repair and Major Alteration.

B. The purpose of the ICA being addressed in Block 8 of Form 337 is to provide the aircraft owner/operator with the following three advantages:

- (1) The major alteration and reference to ICA are contained in one document;
- (2) The ICA becomes a permanent aircraft record as required by Title 14 of the Code of Federal Regulations (14 CFR), section 91.417(a)(2)(vi);
and
- (3) The owner/operator can contact FAA registry for a replacement FAA Form 337 if the ICA is lost or destroyed. The additional reference to the presence of ICA as part of the major alteration in the aircraft’s maintenance entry, will ensure that maintenance personnel appropriately address ICAs during future inspections.

2. **Background.** Prior to January 1998, FAA’s policy did not require ICAs when additional appliances were installed on aircraft as a major alteration under the FAA Field Approval process. Maintenance personnel did not have instructions on hand regarding how to service, maintain, inspect, and replace those newly installed appliances or equipment. Without ICAs, a mechanic performing maintenance on items installed under a field-approved major alteration could be in violation of part 43, section 43.13(a).

A. In order to standardize the major alteration field approval process, the Continuous Airworthiness Maintenance Division, AFS-300, issued FSAW 98-03 in January 1998. The bulletin formalized FAA Policy to require ICA from the effective date of the bulletin for all field-approved major alterations permitted by FAA Order, 8300.10, Airworthiness Inspectors Handbook; vol. 2, chapter 1.

B. The reasons for an ICA are twofold. The first reason is to ensure that Flight Standards Service's Field Approval Policy is in line with part 21, section 21.50, which requires ICA for the holder of a type certificate or an Supplemental Type Certificate (STC) applied for after January 1981.

C. The second reason for an ICA is to provide the certificated person performing an inspection or maintenance on the field-approved major alteration, with instructions on how to maintain that change to the aircraft's type design, as required by section 43.13(a) and section 43.16.

3. **Discussion.**

A. The ICA is to be developed by the applicant and presented in conjunction with the field approval request. An ICA is accepted by the FAA inspector if it meets the applicable requirements in sections 23.1529, 25.1529, 27.1529, 29.1529, 31.82, 33.4 and 35.4. The checklist attached to this handbook bulletin is a guide so the applicant can be assured that all applicable requirements are met.

B. For field-approved major alterations to aircraft, engines, and propellers certificated under the Civil Air Regulations (CAR), the ICA must meet the original type design requirements. In cases where the major alteration is a total new design, or of substantial complete redesign, which the CAR did not address, the major alteration must meet the applicable 14 CFR (ref.: section 21.101.) The checklist will provide acceptable guidance for these types of installations.

C. The ICA requirements are the same for a field-approval or STC. However, the vast majority of field approved major alterations are simplistic in design and execution. Therefore the applicant's ICA may not need as much detail as an ICA required for a complicated STC. Because of a legal interpretation on use of manufacturers' proprietary instructions, in order to reference the manufacturers' service instructions, the applicant must secure the manufacturers' permission. Once the manufacturer's permission is obtained, those instructions may be "referenced" in the ICA. If the manufacturers' instructions are not available, the applicant may use FAA publications such as Advisory Circular (AC) 43.13-1B and (AC) 43.13-2A, appendix D of part 43, as revised, or other applicable aviation standards to develop the ICA.

D. For field approval installations that also incorporate STC or Designated Engineering Representative(DER)data, the ICA should incorporate or reference the DER/STC maintenance instructions or the STC's ICA.

E. The owner/operator should be made aware that field approved and STC installed equipment are required to be operational, unless specifically listed on the MMEL/MEL for the aircraft.

F. Under this new policy, field-approved major alterations approved under the field approval process prior to the effective date of FSAW 98-03, are not required to have an ICA. However, if an owner/operator wishes to formally incorporate ICA for existing field-approved major alterations, they may do so using the revision process in the checklist's item #16.

4. **Location.** The material covered in this bulletin shall be incorporated in FAA Order 8300.10, Airworthiness Inspector's Handbook; volume 2, chapter 1. Until this material is incorporated into the handbook, inspectors should make a note of this bulletin in the margin of the affected chapter.

/s/

Ava L. Mims, Manager
Continuous Airworthiness Maintenance Division

Attachment

ICA continued

ATTACHMENT

Field Approval, Major Alteration

Instructions for Continued Airworthiness Checklist

ICA Check List

The ICA submitted by the applicant should address all 16 items on this checklist and be included or referenced on Block 8 of Form 337. If referenced, the ICA document must be physically attached to Form 337. However, many kinds of equipment, including avionics, require little or no maintenance during their lifetime. Some equipment cannot be field repaired, and most are “remove and replace” items only. For these and similar pieces of equipment, some of the checklist items may not apply. If an item such as Special Tools does not apply, simply put N/A after the check list item.

1. **Introduction:** This section briefly describes the aircraft, engine, propeller, or component that has been altered. Include any other information on the content, scope, purpose, arrangement, applicability, definitions, abbreviations, precautions, units of measurement, referenced publications, and distribution of the ICA as applicable.
2. **Description:** Of the major alteration, its functions, including an explanation of its interface with other systems, if any.
3. **Control, operation information:** Or special procedures, if any.
4. **Servicing information:** Such as types of fluids used, servicing points, and location of access panels, as appropriate.
5. **Maintenance Instructions:** Such as recommended inspection/maintenance periods in which each of the major alteration components are inspected, cleaned, lubricated, adjusted, tested, including applicable wear tolerances and work recommended at each scheduled maintenance period. This section can refer to the manufacturers’ instructions for the equipment installed where appropriate (e.g., functional checks, repairs, inspections.) It should also include any special notes, cautions, or warnings, as applicable.
6. **Trouble shooting information:** Information describing probable malfunctions, how to recognize those malfunctions, and the remedial actions to be taken.
7. **Removal and replacement information:** This section describes the order and method of removing and replacing products, parts and any necessary precautions. This section should also describe or refer to manufacturer’s instructions to make required tests, trim checks, alignment, calibrations, center of gravity changes, lifting or shoring, etc., if any.
8. **Diagrams:** Of access plates and information, if needed, to gain access for inspection.
9. **Special inspection requirements:** Such as X-ray, ultrasonic testing, or magnetic particle inspection, if required.
10. **Application of protective treatments:** To the affected area after inspection and/or maintenance, if any.
11. **Data:** Relative to structural fasteners such as type, torque, and installation requirements, if any.
12. **List of special tools:** Special tools that are required, if any.
13. **For commuter category aircraft:** The following additional information must be furnished, as applicable:
 - A. Electrical loads
 - B. Methods of balancing flight controls
 - C. Identification of primary and secondary structures
 - D. Special repair methods applicable to the airplane.
14. **Recommended overhaul periods:** Are required to be noted on the ICA when an overhaul period has been set by the manufacturer of a component, or equipment. If there is no overhaul period, the ICA should state for item 14: “No additional overhaul time limitations.”

15. **Airworthiness Limitation Section:** Include any “approved” airworthiness limitations identified by the manufacturer or FAA Type Certificate Holding Office (e.g., AN STC incorporated in a larger field approved major alteration may have an airworthiness limitation.) The FAA inspector should not establish, alter, or cancel airworthiness limitations without coordinating with the appropriate FAA Type Certificate Holding Office. If there are no changes to the airworthiness limitations, the ICA should state for item 15: “No additional airworthiness limitations” or “Not Applicable.”

16. **Revision:** This section should include information on how to revise the ICA. For example, a letter will be submitted to the local FSDO with a copy of the revised FAA Form 337 and revised ICA. The FAA inspector accepts the change by signing Block 3 and including the following statement:

“The attached revised/new Instructions for Continued Airworthiness (date_____) for the above aircraft or component major alteration have been accepted by the FAA, superceding the Instructions for Continued Airworthiness (date_____).” Once the revision has been accepted, a maintenance record entry will be made, identifying the revision, its location, date of the Form 337.

17. **Assistance:** When the Flight Standards Inspectors’ has any questions regarding ICA or needs assistance with ICA, they may contact the appropriate Aircraft Evaluation Group listed below:

Product Type	AEG Office	Name	Phone Number
Transport Airplane	Seattle AEG	Thomas Newcombe	(425) 227-2274
Transport Airplane	Long Beach AEG	Lee Koegel	(562) 627-5288
Small Aircraft (GA)	Kansas City AEG	Bill Palmerton	(816) 426-3946
Rotorcraft and Power Lift Aircraft	Fort Worth AEG	E. Richard Thomas	(817) 222-5272
Engine and Propeller	Boston AEG	William Machado	(781) 238-7887

18. **Implementation and Record Keeping:** For major alterations performed in accordance with FAA Field Approval policy, the owner/operator operating under part 91 is responsible for ensuring that the ICA is made part of the applicable section 91.409 inspection program for their aircraft. This is accomplished when a maintenance entry is made in the aircraft’s maintenance record in accordance with section 43.9. This entry records the major alteration and identifies the original ICA location (e.g., Block 8 of FAA Form 337, dated 5/28/98) along with a statement that the ICA is now part of the aircraft’s inspection/maintenance requirements.

For major alterations performed in accordance with a field approval on air carrier aircraft, the air carrier operator is responsible for ensuring that the ICA is made part of the applicable inspection/maintenance program for their aircraft. If a procedure is not currently included in the operator’s manual to incorporate ICA, this process will need to be appropriately addressed (i.e. the operator submits a revision to its maintenance program to the applicable certificate-holding district office (CHDO)).

For aircraft inspected under an Approved Aircraft Inspection Program (AAIP), the operator will submit a change to the CHDO in accordance with section 135.419 b).

For air carrier aircraft inspected using an annual/100 hour inspection program, a reference to the new ICA will be made in the aircraft’s maintenance record in accordance with section 43.9. This entry records the major alteration and identifies the original ICA location (e.g., ICA are located/attached to Block 8 of FAA Form 337, dated 5/28/98). In addition, the operator will request a revision to the operator’s Operations Specifications, additional maintenance requirements, which incorporates the ICA into the inspection program.

APPENDIX 5

Seattle Aircraft Certification Office

Guide for the Publication Of

FAA Approved

Flight Manual Supplements

or

Supplemental Flight Manuals

in Support of

STC or FAA Form 337 Projects

GENERAL

The following guidance is provided to assist in the preparation of the individual FAA Approved aircraft flight manual supplements or supplemental aircraft flight manuals. Guidance detailing the information required to be included in the basic FAA Approved Airplane Flight Manual, FAA Approved Airplane Flight Manual Supplements, or FAA Approved Supplemental Airplane Flight Manuals are contained in 14 CFR part 23, 25, 27, or 29 sections 1581 through 1589. Also included in the guidance that follows are several items relating to current FAA policy regarding aircraft flight manual Information.

Approvals for modifications to all aircraft require a FAA Approved AFM Supplement or FAA Approved Supplemental AFM for modifications that change or add new aircraft limitations, procedures, or performance, regardless of whether they were originally Type Certificated with a FAA approved AFM.

NOTE

This format guide is for the Seattle Aircraft Certification Office. Other ACOs may suggest or require some variations to this (such as signature blocks). If the document is to be submitted to a different office, the applicant should check with that office for any local policies or requirements regarding format, signature blocks, etc.

DEFINITIONS

AIRCRAFT - For discussion purposes, the term “aircraft” means:

- 1) FAA Approved “Airplane” Flight Manuals (AFM) which include small airplanes, commuter airplanes, and Transport airplanes (Generally FAR 23, 25 or their predecessors)
- 2) FAA Approved “Rotorcraft” Flight Manuals (RFM) for normal or transport rotorcraft (generally FAR 27 and 29 or their predecessors)
- 3) FAA Approved “Glider” Flight Manuals (GFM)
- 4) FAA Approved “Balloon” Flight Manuals (BFM)
- 5) FAA Approved “Airship” Flight Manual (AFM) (*Yes, AFM is used twice, however, it is expected that most will know the difference between an airplane and an airship)

The use of the acronym AFM throughout this document is intended to include all variations listed above.

GAMA – General Aviation Manufacturers Association

PLACARD AIRCRAFT– Some pre-March 1, 1979, aircraft such as small airplanes under 6000 lb., do not have FAA approved manuals and require placards only. As a result, alterations to these aircraft may require a FAA Approved Supplemental Airplane (Rotorcraft, etc.) Flight Manual. These aircraft may have an Owner’s Manual or some other form of non FAA approved document that may supplemented.

POH – Pilot Operating Handbook. This term does not necessarily always reflect one type of document. The document may be labeled “Pilot’s Operating Handbook and FAA Approved AFM” and utilize the GAMA approved format. It should be noted that a manual using this format is FAA approved in its entirety, therefore there is no requirement to separate approved from unapproved data/pages. However, some manufacturers have produced documents called a Pilot’s Operating Handbook that is not in this format and is not FAA approved. This same type of document may also be called an Owner’s Manual by some manufacturers. However, it should be noted that if the document is one that is FAA approved it will clearly say so within the document.

TCDS – Type Certificate Data Sheet

AFM Supplement – This document supplements or supercedes the data, limitations, and/or procedures contained in the basic FAA Approved AFM.

Supplemental AFM - A FAA Approved document for an aircraft that was originally certificated without a FAA Approved AFM. This document could either stand-alone or supplement another document such as a manufacturer’s published “Owners Manual” or POH that is not a combined “POH and FAA Approved AFM”.

GUIDANCE INFORMATION

- The FAA Approved AFM Supplement is approved as an addendum to the FAA Approved AFM.
- The FAA Approved Supplemental AFM is for aircraft without a basic FAA approved AFM (as listed in the TCDS). Only aircraft that do not have a basic (manufacturer’s) FAA Approved AFM can have a FAA Approved Supplemental AFM. The applicable TCDS should list the required AFM document number, if any.
 - An applicant cannot choose to supplement a manufacturer’s owners manual for an aircraft that has a FAA Approved AFM.
 - Certain aircraft models (e.g. Cessna 337 Skymaster) have some aircraft that do not have a FAA Approved AFM while others of the same model do. This is usually defined on the TCDS by airplane serial number. The applicant should determine whether his/her particular aircraft does or does not require a FAA Approved AFM.
- The applicant’s Name/Address is the same as what appears on the STC or in Block 2 of FAA Form 337 (Aircraft Owner). Only the STC holder or FAA Form 337 owner/operator may request revisions to the FAA Approved AFM Supplement or Supplemental AFM.
- Minor variations in the signature blocks are permitted so long as the required information is specified.
- Page numbering should use a format such as “Page 1 of 6”. However, it is also acceptable for the page number to follow the same format as the document that is being supplemented.
- In general, section labels and numbering should follow that in the document being supplemented. This document could be either a FAA Approved AFM or an unapproved manufacturer’s POH for “placarded” aircraft (for which there is no FAA Approved AFM listed on the TCDS).

- If the Limitations, Procedures, or Performance Section has no change the section title should still be listed with the statement “No Change” under it.

GUIDANCE INFORMATION (cont.)

- Listing the FAA Approved Basic Flight Manual document number and issue date on the title page is optional for aircraft that have only one (i.e. it is clearly identified on the aircraft TCDS as to what the applicable document is).
- If a Supplemental AFM is used to supplement/supersede information contained in a manufacturer’s published document such as an Owner’s Manual or Pilot’s Guide, then the document number and date should be listed on the Title Page of the supplement.
- It should be noted that many small aircraft have a document called “Pilot’s Operating Handbook and FAA Approved Airplane Flight Manual” that utilizes the GAMA approved format. In these cases the entire document is FAA approved and it is especially important that the AFM Supplement follow the same format as the basic manual (i.e. section names, labels, etc.)
- For FAA Form 337 or One-Only STC approvals, the aircraft serial number and registration number is required. AFM Supplements and Supplemental AFMs for field approvals should be for one aircraft only. If an applicant has more than one aircraft and is repeating the Form 337 approval on each, then there should be separate documents for each aircraft.
- The Table of Contents and a Log of Pages are optional for short, non-complex flight manuals (generally less than 5 or 6 page including the title page)
 - If a revision is made to an AFM that does not contain a Log of Pages or Log of Revisions, one must be added as part of the revision except for single page AFMs or when all pages are being revised. In this case, the title page should list both the original issue date and the revision date as shown in Figure 9.
- Figure 9 shows an example of a single page FAA Approved AFM Supplement. A single page FAA Approved Supplemental AFM may be created by making the wording changes to this example as shown in Figure 5.
- The Date column on the Log of Pages should be left blank when submitting the document for approval. This date will be added by the approving authority and corresponds to the date the document is approved/signed. Under the Page No. column it is permissible to use the format “1-9” in the date column, so long as all pages have the same FAA approved date. Generally, stating “all” under the Page No. column is only permissible if the page numbers at the bottom of every page use the format “Page 3 of 16”. It must be clear how many pages the document contains.
- If the AFM Supplement or Supplemental AFM incorporates by reference a vendor’s Pilot Operating Guide (e.g. for instruction on the use of avionics) there must be a statement requiring the availability of the document in the limitations section of the supplement. This statement must list the vendor’s document number and publication date (but should include the statement “or later applicable revision”). FAR 23.1583 (h) states under the requirement for including Operating Limitations in the AFM that:

GUIDANCE INFORMATION (cont.)

- Kinds of operation. A list of the kinds of operation to which the airplane is limited or from which it is prohibited under Sec. 23.1525, and also a list of installed equipment that affects any operating limitation and identification as to the equipment's required operational status for the kinds of operation for which approval has been given.
 - This is usually represented as a Kinds of Operation Equipment List (KOEL) in the Limitations section of the Basic AFM. The applicant must ensure that any aircraft modification (in particular instrument or avionics installations) that affects this list is taken into account and reflected in the FAA Approved AFM Supplement or Supplemental AFM.
- If the applicant obtains a generic AFM Supplement from a product manufacturer, this should only be treated as a guide. The applicant is responsible for ensuring that the document submitted for FAA approval only contains limitations, procedures, performance data, and other information relevant to that aircraft's unique installation.
 - As previously noted, the applicant should ensure that they use the proper document (e.g. FAA Approved AFM Supplement vs. FAA Approved Supplemental AFM). The manufacturer's example may be an AFM Supplement but a particular installation may require a FAA Approved Supplemental AFM if the aircraft is a "Placard Aircraft".

Current FAA Policies

Note: This section is not meant to be an all-inclusive list of FAA policy regarding AFMs. It provides some of the more common and widely used policies.

- **Current FAA policy requires** that for any modification that may **adversely** affect cruise, range, endurance, or fuel used (sometimes called time/distance/fuel used to climb) performance for aircraft which have this information published in either a FAA Approved AFM or an unapproved POH, the applicant must either:
 - 1) publish new cruise, range, endurance, and/or fuel used performance data, or
 - 2) include both a limitation (in the limitations section) prohibiting the use of the fuel consumption data in the basic AFM/POH and a statement in the performance section stating that the data is not approved for use.
- Examples of the types of modifications that this pertains to include (but are limited to) modifications significantly increasing the total drag on the aircraft or engine changes that affect the fuel consumption.
- This policy only applies to the cruise, range, endurance, or fuel used data and should not be applied to the performance data required to be published by the FARs (e.g. takeoff/land distance, climb performance). This data must still be published or a statement made that it is equal to or better than that shown in the basic AFM.
- Current FAA Small Airplane Directorate policy requires that for small airplanes (under 12,500 lb.) that have a FAA Approved Airplane Flight Manual and Pilot's Operating Handbook that utilizes the format established by industry (GAMA), that this format must be continued or the applicant must issue a complete new AFM.

NOTE

The applicant should check with their local office for any changes to existing policy of new policy that may affect the content of the document

(Applicant's Name & Address)

Supplement No. (Applicant's Number)

FAA APPROVED
[AIRPLANE OR ROTORCRAFT] FLIGHT MANUAL SUPPLEMENT
TO THE
(MAKE & MODEL)
[AIRPLANE OR ROTORCRAFT] FLIGHT MANUAL

(STC or FAA Form 337 SUBJECT TITLE)

Aircraft S/N _____ Aircraft Reg. No. _____

This supplement must be attached to the FAA Approved [AIRPLANE OR ROTORCRAFT] Flight Manual, (basic [A]FM issue date or document number), when the aircraft is modified by the installation of (type of modification or equipment installed) in accordance with (STC No. or FAA Form 337 approval date).

The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the basic [AIRPLANE OR ROTORCRAFT] Flight Manual.

FAA Approved _____
Manager, Flight Test Branch, ANM-160S
Federal Aviation Administration
Seattle Aircraft Certification Office
Transport Airplane Directorate

Date _____

Figure 1. Format Guide for Aircraft Flight Manual Supplements – Title Page

(Applicant's Name & Address)

337]

Supplement No. (Applicant's Number)

SUPPLEMENT FOR
(MAKE & MODEL) AFM
[STC NUMBER OR FAA Form

LOG OF PAGES

Rev. No.	Page No.	Date	Description	FAA Approved
Original	Title Log Contents 1-1 2-1 3-1 4-1	01/01/2000 01/01/2000 01/01/2000 01/01/2000 01/01/2000 01/01/2000	Complete Supplement	_____ Mgr., Flt. Test Br., ANM-160S FAA, Seattle ACO Transport Airplane Directorate Date _____
1	Title * Log Contents * 1-1 2-1 3-1 * 4-1	01/01/2000 06/14/2000 01/01/2000 06/14/2000 01/01/2000 01/01/2000 06/14/2000	Revised Limitations and Performance	_____ Mgr., Flt. Test Br., ANM-160S FAA, Seattle ACO Transport Airplane Directorate Date _____

Revised pages marked with "*" symbol.

(Log Page No.)

Figure 2. Format Guide for Aircraft Flight Manual Supplements – Log of Pages

(Applicant's Name & Address)

337]

Supplement No. (Applicant's Number)

SUPPLEMENT FOR
(MAKE & MODEL) AFM
[STC NUMBER OR FAA Form

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	Limitations.....	1-1
2	Emergency Procedures.....	2-1
3	Normal Procedures.....	3-1
4	Performance.....	4-1

FAA Approved Date _____

(Contents Page No.)

Figure 3. Format Guide for Aircraft Flight Manual Supplements – Table of Contents

(Applicant's Name & Address)

337]

Supplement No. (Applicant's Number)

SUPPLEMENT FOR
(MAKE & MODEL) AFM
[STC NUMBER OR FAA Form

(Section No.)

(Section Title)

(Section Heading)

(Section Text)

{if No Change, then state No Change}

FAA Approved Date _____

(Page No.)

Figure 4. Format Guide for Aircraft Flight Manual Supplements – Text Page (Typical)

(Applicant's Name & Address)

Supplement No. (Applicant's Number)

FAA APPROVED

SUPPLEMENTAL [AIRPLANE OR ROTORCRAFT] FLIGHT MANUAL

FOR

(MAKE & MODEL)

(STC or FAA Form 337 SUBJECT TITLE)

Aircraft S/N _____ Aircraft Reg. No. _____

This supplement is required when the aircraft is modified by the installation of *(type of modification or equipment installed)* in accordance with *(STC No. or FAA Form 337 approval date)*.

The information contained herein supplements or supersedes the basic placards, markings, and manuals only in those areas specified. For limitations, procedures, and performance information not contained in this supplement, consult the basic airplane placards, markings, and manuals

FAA Approved _____
Manager, Flight Test Branch, ANM-160S
Federal Aviation Administration
Seattle Aircraft Certification Office
Transport Airplane Directorate

Date _____

**Figure 5. Format Guide for Supplemental Airplane Flight Manuals – Title Page
(for airplanes without an FAA Approved AFM, See FAR 21.5)**

(Applicant's Name & Address)

337]

Supplement No. (Applicant's Number)

SUPPLEMENTAL AFM TO

(MAKE & MODEL)

[STC NUMBER OR FAA Form

LOG OF PAGES

Rev. No.	Page		Description	FAA Approved
	No.	Date		
Original	Title	01/01/2000	Complete Supplement	<hr/> Mgr., Flt. Test Br., ANM-160S FAA, Seattle ACO Transport Airplane Directorate Date _____
	Log	01/01/2000		
	Contents	01/01/2000		
	1-1	01/01/2000		
	2-1	01/01/2000		
	3-1	01/01/2000		
	4-1	01/01/2000		
1	Title	01/01/2000	Revised Limitations and Performance	<hr/> Mgr., Flt. Test Br., ANM-160S FAA, Seattle ACO Transport Airplane Directorate Date _____
	* Log	06/14/2000		
	Contents	01/01/2000		
	* 1-1	06/14/2000		
	2-1	01/01/2000		
	3-1	01/01/2000		
	* 4-1	06/14/2000		

Revised pages marked with "*" symbol.

(Log Page No.)

**Figure 6. Format Guide for Supplemental Airplane Flight Manuals – Log of Pages
(for airplanes without an FAA Approved AFM, See FAR 21.5)**

(Applicant's Name & Address)

Supplement No. (Applicant's Number)

FAA APPROVED
[AIRPLANE OR ROTORCRAFT] FLIGHT MANUAL SUPPLEMENT
TO THE
(MAKE & MODEL)
[AIRPLANE OR ROTORCRAFT] FLIGHT MANUAL

(STC or FAA Form 337 SUBJECT TITLE)

Aircraft S/N _____ Aircraft Reg. No. _____

This supplement must be attached to the FAA Approved [Aircraft] Flight Manual, (basic [A]FM issue date or document number), when the aircraft is modified by the installation of (type of modification or equipment installed) in accordance with (STC No. or FAA Form 337 approval date).

The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this supplement, consult the basic [AIRPLANE OR ROTORCRAFT] Flight Manual.

- I. Limitations – Operation with Is prohibited.
- II. Emergency Procedures - No Change
- III. Procedures - No Change
- IV. Performance - No Change to Basic AFM

FAA Approved _____
Manager, Flight Test Branch, ANM-160S
Federal Aviation Administration
Seattle Aircraft Certification Office
Transport Airplane Directorate

Date: _____

Page 1 Of 1

Revised Date: _____

Figure 9. Format Guide for Single Page Aircraft Flight Manual Supplements